WASHINGTON DEPARTMENT OF ECOLOGY

RESPONSE TO PUBLIC COMMENTS

ALCOA, INC., WENATCHEE WORKS
NPDES PERMIT WA-000068-0

May 17, 2006

Ecology published a public notice for issuance of the Alcoa Wenatchee NPDES Permit on January 19, 2006, in *the Wenatchee World*. In the notice we invited public evaluation of the proposed permit and provided for a 30 day public comment period. Ecology received comments from the Columbia Riverkeepers on February 17th 2006.

Ecology will make changes to the permit, where appropriate, to improve clarity and address those comments. We describe those changes in this Response to Comments.

Summaries of those comments appear below in bold type. Ecology's reasons for making – or not making – changes follow each summary. The questions and responses are divided into four sections (using Roman numerals) according to general topic areas.

If you have any questions regarding this Response to Comments please call Bob King in Lacey at 360/407-7563.

I. Lack of Current and Reliable Data

Ecology has stated that it lacks basic information about the existing conditions within the Columbia River near Wenatchee. This information is necessary in order to accurately establish effluent limits that are protective of water quality standards and the beneficial uses they are established to protect. The fact sheet itself states:

"The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification given in Chapter 173-201A WAC…" (Fact Sheet Page 9)

This is not the first time Ecology has admitted to this lack of basic and necessary information. In another recent Wenatchee area permit application, the Ecology stated the following in response to our comments:

"The agency has insufficient ambient data. Given the paucity of data regarding pollutant concentrations in the Columbia River near Wenatchee, an adequate Reasonable Potential study is not feasible." (Addendum to the Fact Sheet for NPDES Permit Number WA-005152-7 Page 6 (2005)).

Even more troubling than the "paucity" of this basic information is the fact that rather than collecting this necessary information before issuing permits, Ecology has instead granted applicants lenient permit conditions. In this case, Ecology has set Alcoa's mixing zone size at the maximum 300 foot limit allowed under Washington law despite the fact the Ecology lacks basic information about existing water quality in this stretch of the Columbia River. (WAC 173-201A-100) Polluters should not benefit from Ecology's failure to obtain the very basic information that is crucial to determining whether permit conditions are actually protective of water quality. If anything, permit conditions should take into account this lack of information and err on the side of being overprotective rather than insufficient. Considering the presence of several Endangered Species Act listed salmonids in this section of the Columbia River, and the number of dischargers in the Wenatchee area, there is no excuse for lacking this necessary information.

Ecology's mission is to protect the health of Washington's citizens and its ecosystem, not the bottom line of polluters.

Question #1: Why does Ecology lack this basic and essential information?

Response: The specific statement the commentor refers to (fact sheet page 9) is an incorrect statement that we should have revised prior to publishing this fact sheet. We possess sufficient information about that segment of the Columbia River to evaluate the potential for Alcoa's discharge to impact water quality. Despite limited data at the specific discharge location, information available at nearby receiving water stations provides enough information to set permit limits.

Although the fact sheet referred to limited receiving water information in the vicinity of the discharge, Ecology reviewed additional temperature data available at upstream and downstream dams and at Ecology monitoring stations in preparation of this permit. We also referred to a report submitted by Alcoa in February 1999; the report described temperature conditions in both the smelter's discharge and the receiving water. There is no indication that conditions have changed since 1999 other than the fact that the smelter is not operating at full capacity. The discharge is monitored on an ongoing basis for: total suspended solids (TSS), cyanide, fluoride, aluminum, and benzo(a) pyrene; for oil and grease, temperature, flow, pH, priority pollutants and for whole effluent toxicity.

Given the measured characteristics of the wastewater discharge, and the water quality sampling data collected upstream and downstream from Alcoa's wastewater discharge outfall, Ecology has the necessary information to evaluate the smelter's discharge and its impacts to the Columbia.

Question #2: How much information on existing water quality is available?

Response: Ecology sampled the following nearby ambient monitoring stations on the Columbia River. Those stations, with the data collection years in parentheses, include:

the Chelan station (1991-1992), at Highway 2 Bridge (2006), and below the Rock Island Dam (1978 – 1991). Ambient data measured includes: ammonia, nitrite and nitrate concentrations, dissolved oxygen levels; pH, temperature; turbidity and fecal coliform concentrations. Alcoa collected ambient receiving water data in 1999 which included temperature, dissolved oxygen, pH, conductivity, fluoride, TSS, hardness, sulfide, and metals (Aluminum, Cadmium, Copper, Mercury, Lead, and Zinc).

Question #3: Assuming there is some information on existing water quality available; who was it provided by and when?

Response: Ecology required Alcoa Wenatchee to conduct a receiving water study; the company reported the study results to Ecology on February 24, 1999. The NPDES water study was conducted for Alcoa, and the report was prepared by, Parametrix, Inc. Our response to Question #2 notes reliable sources of additional information about the receiving water.

Question #4: The fact sheet states that the applicant assumed maximum receiving water temperatures of 20.6 degrees Celsius. Where was this value obtained from?

Response: Ecology obtained temperature data from the NPDES report dated February 24, 1999. As noted above, we also reviewed the data available at the ambient stations.

Question #5: Does Ecology have any plans to start monitoring ambient water quality in this area?

Response: This permit requires Alcoa to monitor the temperature of intake water on a daily basis, collecting more upstream temperature data to be considered in the next permit cycle. Monitoring at ambient stations in the Columbia will continue.

Question #6: Has Ecology ever provided permit writers with any guidance on how to draft NPDES permits for discharges in areas where the department lacks sufficient information on existing water quality?

Response: Permit writers use the most current version of Ecology's *Permit Writer's Manual* to draft NPDES permits. Chapter VI includes discussion of ambient data evaluation to define water quality impacts and derive effluent limits. Ecology offers access to this guide by posting it on the web at: http://www.ecy.wa.gov/pubs/92109.pdf.

Question #7: Has the Environmental Protection Agency (EPA) ever provided Ecology with any guidance on how to draft NPDES permits for discharges in areas where the department lacks sufficient information on existing water quality?

Response: The EPA has not provided this type of guidance.

II. Unlawful Mixing Zone

Considering the fact that Ecology has admitted that there is a "paucity of data regarding pollutant concentrations in the Columbia River near Wenatchee," such that "an adequate Reasonable Potential study is not feasible," Ecology lacks the information necessary to support the use of a mixing zone and therefore may not grant Alcoa a mixing zone without violating Washington's mixing zones law. (Addendum to the Fact Sheet For NPDES Permit No. WA-005152-7 Page 6) Washington's mixing zone provision states:

> **"No mixing zone shall be granted unless the supporting information clearly indicates the mixing zone would not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by the department."**
> **WAC 173-201A-100(4).**

The information that is currently available does not clearly indicate that Alcoa's mixing zone would not have a reasonable potential to cause adverse effects to this section of the Columbia River. Ecology has admitted that a reasonable potential analysis is not even feasible for this section of the Columbia River because there is barely any information available on existing water quality in the area. Because Ecology lacks the information that is required before a mixing zone may be permitted, Ecology must revoke Alcoa's authorization to use a mixing zone. Failure to do so will violate Washington's mixing zone law.

Question #8: Does Ecology believe that the scarce information it has clearly indicates that Alcoa's mixing zone would not have a reasonable potential to substantially interfere with all existing or characteristic uses of the water body including: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation? If so, what information supports the conclusion that each of the above uses will not be substantially interfered with?

Response: Ecology's "reasonable potential" analysis of this discharge is attached to this Response to Comments. Note the spreadsheet shows no reasonable potential to exceed water quality standards.

We used the actual value in the effluent, or the detection limit (when a pollutant was not detected in the effluent), to perform our analyses. Both the water quality analysis and the human health criteria analysis show few pollutants in the effluent. The only pollutants detected that have either human health criteria or aquatic life criteria include aluminum, copper, total residual chlorine and zinc.

And the low concentrations of these pollutants meet water quality standards in the effluent. Temperature is the only pollutant that does not meet water quality criteria in the discharge prior to mixing. We discuss temperature effects later in this document. The only other chemical pollutant with detectable concentrations is fluoride, which does not have a promulgated human health or aquatic life criteria. Based on this information Ecology has concluded the discharge as proposed will not interfere with beneficial uses.

Question #9: What species are likely to be affected by the mixing zone?

Response: Ecology does not separately evaluate the potential impacts on individual species when writing each permit. We review known characteristics of the discharge (chemical and whole effluent toxicity tests), and receiving water characteristics at the discharge location. Based on that information review, Ecology decides whether or not a discharge poses a reasonable potential to cause the loss of sensitive or important habitat, substantially interferes with existing or characteristics uses, results in damage to the ecosystem or adversely affects public health. Ecology relies on the aquatic life criteria and depends on the ability of the discharge to meet those criteria at the edge of the mixing zone to protect aquatic species. Based on our reasonable potential to exceed analysis the discharge should pose no risk of ill effects on aquatic species in the mixing zone.

Question #10: Did Ecology analyze the effect of toxicity in the mixing zone on these species?

Response: In addition to completing a reasonable potential analysis, Ecology has required Alcoa Wenatchee to conduct whole effluent toxicity tests (WET) since the early 1990s. A summary of Alcoa's acute WET data attached shows generally 100% survival in 100% effluent. This data indicates that there should be no toxic affects at the edge of the mixing zone.

Question #11: Does Ecology expect any salmonids or other fish species to be killed or injured as a result of the toxicity inside the mixing zone? How did Ecology reach that conclusion?

Response: The only toxic metals measured in the effluent of potential concern were aluminum and copper. The maximum concentration of copper in the Alcoa Wenatchee discharge was 4.01µg/l. This value is well below the freshwater acute criteria of 11.5 µg/l and the freshwater chronic aquatic life standard of 7.96 µg/l. The maximum concentration of aluminum in the Alcoa Wenatchee discharge was 21.9 µg/l. This value is well below the EPA-recommended acute aquatic life criteria of 750 µg/l. The levels of copper and aluminum in the mixing zone should not effect salmonids or other fish species.

Ecology expects no fish species response to temperature effects, except perhaps some avoidance reaction, by juvenile salmon migrating downstream. The river velocity at this discharge location is somewhere between 1.52 and 3.7 feet/second during juvenile

salmon migration (spring). Juveniles drifting, but not actively swimming downstream, will pass through the acute zone (33.6 feet) during an exposure timeframe ranging from 9.1 to 22 seconds. The incipient lethal temperature for salmonids acclimated at 12° C is 30.42° C for 30 seconds. The river temperature at the time of downstream migration (June) is 10 to 15° C and the effluent temperature at this time of year is 18.9° C or lower. The dilution that occurs after discharge from a diffuser is logarithmic, so the effluent is approaching ambient temperatures (a 2° C difference) within a distance of 2 to 3 meters (10 feet) from the discharge point. The time to drift through this distance is 6.5 seconds. In addition, juveniles use the upper water column of the river during downstream migration so they may not even be exposed to the higher temperature. Upstream migrants exposed to higher temperatures have the ability to avoid high temperatures. Their avoidance may cause some loss of energy but not death.

Question #12: Does Ecology believe that the scarce information it has clearly indicates that Alcoa's mixing zone would not have a reasonable potential to result in damage to the ecosystem? If so, what information supports this?

Response: Ecology has adequate information to determine that Alcoa's discharge posed no reasonable potential to damage the ecosystem. Our evaluation of the discharge's ability to meet aquatic life criteria and Alcoa's whole effluent toxicity testing results confirm this determination.

Question #13: Does Ecology believe that the scarce information it has clearly indicates that Alcoa's mixing zone would not have a reasonable potential to adversely affect public health? If so, what information supports this?

Response: Ecology believes that we had adequate information (stated above) to determine that Alcoa's discharge poses no reasonable potential to adversely affect public health. Our evaluation of sampling data compels us to conclude the discharge does not contain detectable quantities of pollutants with human health criteria.

Question #14: If a reasonable potential study is not feasible in this section of the Columbia River, how then was Ecology able to determine that granting a maximum sized mixing zone would not have a reasonable potential to have adverse effects on the Columbia River? If there is a paucity of information, then what information clearly indicated that a mixing would not cause adverse effects?

Response: Ecology completed a reasonable potential analysis of the discharge and concluded that a mixing zone would not have adverse effects in this section of the River.

Question #15: Why is the Mixing Zone Analysis section left blank in Appendix D of the fact sheet?

Response: The fact sheet as posted to the Ecology website mistakenly lacked the appendices. We emailed this information to you on March 7, 2006. We have also attached our mixing zone analysis to this Response to Comments.

Question #16: Why is the Reasonable Potential to Exceed Analysis section left blank in Appendix E of the fact sheet?

Response: The fact sheet posted to the Ecology website mistakenly did not include a copy of the appendices. This information was emailed to you on March 7, 2006. The reasonable potential analysis is attached.

Question #17: Considering the fact that Ecology admits lacking necessary information on existing water quality, why didn't Ecology err on the side of caution when it set the size limit on Alcoa's mixing zone?

Response: Ecology's practice is to minimize the size of the mixing zone by using model inputs with a low probability of occurrence. For example, to run dilution models we used model inputs such as the 95th percentile expected pollutant concentration, the 90th percentile background concentration, the centerline dilution factor and the lowest flow occurring once in every 10 years. These criteria predict a conservative dilution factor.

Question #18: According to Washington's Mixing Zone law, "the size of a mixing zone and the concentrations of pollutants present shall be minimized." WAC 173-201A-100. What steps did Ecology take to minimize the size of the mixing zone? What steps did Ecology take to minimize the concentration of pollutants present?

Response: Ecology applies model inputs with a low probability of occurrence to minimize the mixing zone's size (note our response to Question #17, above). Discharge limits imposed by the permit minimize pollutants.

Question #19: Has there been any process or other changes at the Alcoa facility since the previous permit was issued that would affect the nature of its discharge? If so, what were these changes and how did they influence the discharge?

Response: There has been no major process change at the smelter which would affect the nature of the discharge except that Alcoa is operating at 50% of capacity. Lower production rates create lower quantities of pollutants discharged. During the temporary smelter shutdown, Alcoa installed a boiler blowdown pH adjustment system which has resulted in better pH control in the discharge.

Question #20: What technology is Alcoa using that's consistent with AKART?

Response: Alcoa's process wastewater includes cooling water, boiler blowdown and stormwater. During dry weather conditions the total suspended solids (TSS) concentration in the discharge is generally very low (see table below). The discharge

meets or exceeds typical TSS levels from settling basins which is the AKART treatment standard for stormwater.

Process wastewater and stormwater is diverted to the stormwater holding pond during a runoff event, when the pH is outside of the range of 7 – 9. During storm events the pH may decrease due to the naturally low pH of rainfall (see data from the National Atmospheric Deposition Program http://nadp.sws.uiuc.edu/).

The maximum TSS values shown in the table below are associated with stormwater events. Diverting the stormwater to the holding pond during those events minimizes the TSS which is actually discharged to the river and assures that the discharge is receiving treatment which meets AKART standards. Because pH can be instantaneously measured it serves as a surrogate for TSS and therefore can be used to indicate when diversion should occur.

TSS CONCENTRATION AT OUTFALL 001

	Average	Maximum
Jan-05	0.3	1.5
Feb-05	0.2	2.3
Mar-05	0.1	1.6
Apr-05	0.5	6.4
May-05	1.3	22.5
Jun-05	0.5	9.7
Jul-05	1	12.4
Aug-05	0.4	9.8
Sep-05	0.1	0.8
Oct-05	0.2	0.7
Nov-05	0.2	1.6
Dec-05	0.9	7.9
Jan-06	0.6	2.7
Feb-06	0.2	3.2

Alcoa treats its domestic wastewater in an activated sludge unit, followed by ultraviolet disinfection. Alcoa combines the treated domestic wastewater with the process wastewater prior to discharging to the Columbia River. Ecology considers the treatment provided in combination with Alcoa's best management practices to be AKART for this type of discharge.

Question #21: There seem to be a lot of facilities that comply with AKART yet need to have 300 foot mixing zones. What is Ecology doing to improve AKART standards?

Response: Permit writers generally include the mixing zone size allowed by Ecology's regulation. We do not generally provide pollutant-specific mixing zones; to do so might change the size of the regulatory box but would not change the conditions in the environment. AKART standards for treatment technologies are those that are known,

available and reasonable consistent with the competition provided in the marketplace. Ecology recognizes when those treatment technologies change.

III. Segmentation of Water Quality-Limited Streams

Despite the fact that there is a water quality monitoring station just 4.3 river miles downstream at Rock Island Dam (RM 450.9), Ecology claims it lacks basic information on existing water quality for this area of the Columbia River.

Question #22: Why does Ecology claim not to have information on existing water quality near Alcoa when monitoring is taking place 4.3 river miles downstream?

Question #23: Why does Ecology treat the segment of the Columbia River next Alcoa differently than the segment 4.3 miles downstream?

Question #24: Has EPA provided Ecology with any guidance on how to treat these segments?

Response to #22 - #24: As noted in the above responses, despite the error in the published fact sheet, Ecology determined we do have enough information to make permit decisions.

Ecology reviewed the Rock Island dam temperature information while drafting the fact sheet. The only pollutant of interest measured at the dam was temperature. The temperature in the fore bay of the dam should generally reflect the temperature at the discharge point. Water quality in a large river system should be consistent over a 5 to 10 mile stretch unless a large tributary flows in at that location. The river segment at the dam tailrace and fore bay are 303(d) listed for temperature because measured temperatures in August and September have exceeded 20ºC (the temperature criteria).

We used the term segment in the fact sheet discussion on temperature to describe the vicinity of the discharge. We were not using the word in the same context, nor did we assign the same meaning, as when the term refers to listing waterbodies.

EPA is the lead agency in the temperature TMDL process for the Columbia River. Until EPA completes the TMDL, Ecology permit writers rely on the Permit Writer's Manual and on water quality program guidance for the elements that allow us to issue permits.

IV. Violation of Washington's Antidegradation Policy

The proposed permit violates Washington's Antidegradation Policy because it fails to protect water of a higher quality than the criteria assigned to this section of the Columbia River, impermissibly allows a large toxic load to impact downstream uses and furthers bioaccumulation of harmful toxics. WAC 173-201A-070. According to Washington's Antidegradation Policy:

> **"Whenever waters are of a higher quality than the criteria assigned for said waters, the existing water quality shall be protected and pollution of said waters which will reduce the existing quality shall not be allowed…" WAC 172-201A-070(4)**

The fact sheet shows that Ecology does have information which demonstrates that temperature in the Columbia River next to the Alcoa facility is of a higher quality than criteria of 20 degrees Celsius assigned to the Columbia River. WAC 173-201A-130(21). According to the fact sheet, Ecology reanalyzed Alcoa's mixing zone using the current operating conditions of the facility. FS 11. During this time, Ecology determined that the *critical condition* for temperature for the Columbia River was 18.8 C. FS 12 (emphasis added). Based on this information, it is reasonable to assume that existing water temperature for this section of the Columbia River scarcely, if ever, reaches 20 degrees Celsius. Despite this knowledge, Ecology has designed a permit that relieves Alcoa from worrying about violating temperature standards on the hottest day of the year. What Ecology should have done was design a permit that protects temperature of a higher quality and temperature-sensitive ESA-listed species by taking into account seasonal variations in stream temperature.

In addition, Ecology has enough information to determine that failing to protect the existing temperature quality next to the Alcoa facility contributes to the reduction of the existing temperature quality in this section of the Columbia River. According to Ecology's Final 2004 Water Quality Assessment, the Columbia River is water quality limited for temperature in WRIA 40 as recorded at the Rock Island monitoring station. 2004 Water Quality Assessment (Final) – Category 5 Listings for WRIA 40. This monitoring station is only 4.3 river miles from Alcoa's discharge. It is reasonable to assume that Alcoa's temperature discharge contributes to this water quality violation. Rather than allowing Alcoa's temperature discharge to continue reducing the existing temperature quality of the Columbia River near the facility and contribute to the temperature problem downstream, Ecology should condition Alcoa's permit to be protective of existing temperature quality near the facility and utilize the cooler water to reduce temperatures downstream.

Question #25: How did Ecology determine that the receiving water at the discharge point <u>could</u> exceed the 20 degrees Celsius standard?

Response: Ecology reviewed the field measurements reported in the 1999 Alcoa study and the information at the Rock Island Dam. The information shows the receiving water temperature does occasionally exceed 20 ºC.

Question #26: If the average temperature during critical conditions was 18.8 degrees Celsius, it is reasonable to assume that ambient temperatures rarely ever reach or exceed the 20 degrees Celsius standard near the Alcoa facility. Did

temperature ever exceed 20 degrees Celsius during the analysis? If it did, how many times during the critical conditions analysis did temperature exceed 20 degrees Celsius?

Response: The 1999 Alcoa study measured the temperature of the intake water in the field five times during 1998. The recorded temperatures were:

20.2 ^{o}C	August 26, 1998
20.0 ^{o}C	September 10, 1998
20.6 ^{o}C	September 24, 1998
17.8 ^{o}C	October 9, 1998
15.6 ^{o}C	October 21, 1998

The data at the Rock Island dam also shows exceedances of 20 ºC occur generally in August and September.

Question #27: Although 20 degrees Celsius is the current temperature standard for the Columbia River, wouldn't it be more consistent with Washington's Antidegradation Policy to set effluent limitations on temperature that take into account seasonal variations? In other words, if the Columbia River near Alcoa reaches 20 degrees Celsius for only a few days during the hottest part of summer, why not set effluent limitations that maintain cooler temperatures during the rest of the year? This would seem especially prudent given the presence of temperature-sensitive, ESA-listed salmonids in the area. Is this something that Ecology is willing to consider here and in future permits?

Response: Ecology included the following paragraph in the fact sheet to describe the impacts of the discharge to the receiving water temperature.

"The impact of the discharge on the temperature of the receiving water was modeled by simple mixing analysis at the maximum temperature conditions. The receiving water temperature at the maximum recorded condition is 20.6 ^{o}C and the maximum effluent temperature is 24 ^{o}C. The predicted resultant temperature at the boundary of the chronic mixing zone is 20.61 ^{o}C and the incremental rise is .01 ^{o}C. Under maximum temperature conditions the incremental rise is negligible and therefore no temperature limits were imposed on the discharge."

Current Water Quality Program policy allows a 0.3 º C temperature rise at the edge of the mixing zone due to the discharge. The 0.01 º C temperature rise is well below that allowance. The temperature of the discharge is well below 33 º C which could cause instantaneous lethality. The temperature of Alcoa's discharge has little or no effect on the temperature of the receiving water. Ecology sees no environmental value in limiting the temperature of the discharge in this case.

Question #28: Does Ecology acknowledge the fact that the Columbia River is water quality limited for temperature near Alcoa as indicated by the Rock Island monitoring station just 4.3 river miles downstream?

Response: Ecology does recognize that the water quality in the Columbia River is limited for temperature. But the EPA is drafting a Total Maximum Daily Load (TMDL) analysis for the Columbia River which will provide standards for future permits.

Question #29: If the Ecology does acknowledge the temperature problem, how did Ecology conclude that Alcoa's discharge won't contribute to the problem?

Response: As noted above the impact of the discharge at the edge of the mixing zone is negligible.

Question #30: Why has Ecology chosen not to set an effluent limit on temperature when the department knows the Columbia River suffers serious temperature quality problems?

Response: Ecology followed agency policy in the determination that limits were not required for Alcoa. The smelter's discharge has a negligible impact on the temperature in the Columbia River.

Reasonable Potential Analysis

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

REASONABLE POTENTIAL CALCU
NPDES PERMIT NO. WA 000068-0
OUTFALL 001

OUTFALL 001	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	State Water Quality Standard		Max concentration at edge of...						Max effluent conc. measured (metals as total recoverable)
				Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	LIMIT REQ'D?	Effluent percentile value	Pn		
Parameter	Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L					ug/L
ALDRIN 309002 1P				2.50	0.0019	0.004	0.001	NO	0.95	0.473	<	0.05
ALUMINUM, total recoverable, pH 6.5-9.0 7429905			3.3400	750		4.475	3.513	NO	0.95	0.717		21.90
ARSENIC (dissolved) 7440382 2M	1.00	1.00		360	190	0.155	0.024	NO	0.95	0.050	<	0.80
BHC - GAMMA 58899 4P (Lindane)				2	0.08	0.004	0.001	NO	0.95	0.473	<	0.05
CADMIUM - 7440439 4M Hardness dependent	0.943	0.943	0.0500	2.36	0.76	0.053	0.050	NO	0.95	0.717	<	0.09
CHLORDANE 57749 6P				2.4	0.0043	0.039	0.006	undetermined	0.95	0.050	<	0.20
CHLORINE (Total Residual) 7782505				19	11	0.004	0.001	NO	0.95	0.050		0.02
COPPER - 744058 6M Hardness dependent	0.996	0.996	0.5800	11.50	7.96	0.788	0.612	NO	0.95	0.717		4.01
CYANIDE 57125 14M				22	5.20	0.001	0.000	NO	0.95	0.779	<	0.01
DDT 50293 7P				1.10	0.001	0.007	0.001	undetermined	0.95	0.549	<	0.10
DDT METABOLITE (DDE) 72559 8P				1.10	0.001	0.007	0.001	undetermined	0.95	0.549	<	0.10
DDT METABOLITE (DDD) 72548 9P				1.10	0.001	0.007	0.001	undetermined	0.95	0.549	<	0.10
DIELDRIN 60571 10P				2.50	0.0019	0.008	0.001	NO	0.95	0.473	<	0.10
ENDRIN 72208 14P				0.18	0.0023	0.007	0.001	NO	0.95	0.549	<	0.10
HEPTACHLOR 76448 16P				0.52	0.0038	0.004	0.001	NO	0.95	0.549	<	0.05
HEPTACHLOR EPOXIDE 1024573 17P				0.52	0.0038	0.004	0.001	NO	0.95	0.549	<	0.05
IRON 7439896					1000	0.004	0.001	NO	0.95	0.050	<	0.02
LEAD - 7439921 7M Dependent on hardness	0.466	0.466	0.0170	40.97	1.60	0.017	0.017	NO	0.95	0.717	<	0.04
MERCURY 7439976 8M	0.85		0.0004	2.10	0.012	0.000	0.000	NO	0.95	0.717	<	0.00117
NICKEL - 7440020 9M - Dependent on hardness	0.998	0.997		995.90	110.60	0.001	0.000	NO	0.95	0.368	<	0.01
PENTACHLOROPHENOL 87865 8A (pH dependent in				0.01	0.01	0.081	0.012	undetermined	0.95	0.473	<	1.00
Polychlorinated Biphenyls (PCB's) 53469219, 11097691, 1104282, 11141165, 12672296, 11096825,				2	0.014	0.081	0.012	NO	0.95	0.473	<	1.00
SELENIUM 7782492 10M				20	5	0.001	0.000	NO	0.95	0.368	<	0.01
SILVER - 7740224 11M dependent on hardness.	0.85			1.69	NA	0.001	0.000	NO	0.95	0.549	<	0.01
TOXAPHENE 8001352 25P				0.73	0.0002	0.363	0.055	undetermined	0.95	0.549	<	5.00
TRICHLOROETHYLENE 79016 29V						0.036	0.006	undetermined	0.95	0.549	<	0.50
TRICHLOROPHENOL 2,4,6 88062 11A						0.081	0.012	undetermined	0.95	0.473	<	1.00
VINYL CHLORIDE 75014 31V						0.036	0.006	undetermined	0.95	0.549	<	0.50
ZINC- 7440666 13M hardness dependent	0.996	0.996	1.4600	80.48	73.49	3.157	1.719	NO	0.95	0.717		30.90
Based on hardness in next column												

OUTFALL 001		Water Quality Criteria for Protection of Human Health	Max concentration at edge of chronic mixing zone.										
ALCOA WENATCHEE, NPDES PERMIT # WA-000068-0	Ambient Concentration (Geometric Mean)			LIMIT REQ'D?	Expected Number of Compliance Samples per Month	AVERAGE MONTHLY EFFLUENT LIMIT	MAXIMUM DAILY EFFLUENT LIMIT	Estimated Percentile at 95% Confidence			Max effluent conc. measured		Coeff Variation
Parameter	*ug/L*	*ug/L*	*ug/L*			*ug/L*	*ug/L*		*Pn*		*ug/L*		*CV*
ACENAPTHENE 83329 1B		670.00	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
ACROLEIN 107028 1V		320	0.02	NO		NONE	NONE	0.50	0.55	<	4.00		0.60
ACRYLONITRILE 107131 2V		0.059	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
ALDRIN 309002 1P		0.00013	0.00	undetermined	1.00	0.0	0.0	0.50	0.55	<	0.05		0.60
ANTHRACENE 120127 3B		9600	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
ANTIMONY (INORGANIC) 7440360 1M		14	0.00	NO		NONE	NONE	0.50	0.37	<	0.01		0.60
ARSENIC (inorganic)		0.018	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
ASBESTOS 1332214		7,000,000 fibers	0.00	NO		NONE	NONE	0.50	0.47	<	0.17		0.60
BENZENE 71432 3V		1.20	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
BENZIDINE 92875 4B		0.00012	0.10	undetermined	1.00	0.0	0.0	0.50	0.47	<	20.00		0.60
BENZO(a)ANTHRACENE 56553 5B		0.0028	0.00	undetermined	1.00	0.6	0.9	0.50	0.55	<	1.00		0.60
BENZO(a)PYRENE 50328 6B		0.0028	0.00	NO		NONE	NONE	0.50	0.55	<	0.10		0.60
BENZO(b)FLUORANTHENE 205992 7B		0.0028	0.00	undetermined	1.00	0.6	0.9	0.50	0.47	<	1.00		0.60
BENZO(k) FLUORANTHENE 207089 9B		0.0028	0.00	undetermined	1.00	0.6	0.9	0.50	0.47	<	1.00		0.60
BHC - ALPHA 319846 2P		0.0039	0.00	NO		NONE	NONE	0.50	0.55	<	0.05		0.60
BHC - BETA 319857 3P		0.014	0.00	NO		NONE	NONE	0.50	0.55	<	0.05		0.60
BHC - GAMMA 58899 4P (Lindane)		0.0190	0.00	NO		NONE	NONE	0.50	0.55	<	0.05		0.60
BIS(2-CHLOROETHYL)ETHER 111444 11B		0.031	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B		1.8	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
BROMOFORM 75252 5V		4.3	0.00	NO		NONE	NONE	0.50	0.47	<	0.50		0.60
BUTYLBENZYL PHTHALATE 85687		1500.0	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
CARBON TETRACHLORIDE 56235 6V		0.25	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
CHLOROBENZENE 108907 7V		680	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
CHLORDANE 57749 6P		0.00057	0.00	undetermined	1.00	0.1	0.2	0.50	0.55	<	0.20		0.60
CHLORODIBROMOMETHANE 124481 8V		0.41	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
2-CHLORONAPTHALENE 91587 16B		1000.00	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
CHLOROETHYL ETHER (BIS - 2) 111444		0.031	0.02	NO		NONE	NONE	0.50	0.55	<	5.00		0.60
CHLOROFORM 67663 11V		5.70	0.00	NO		NONE	NONE	0.50	0.47	<	0.50		0.60
CHLOROISOPROPYL ETHER (BIS-2) 108601		1400	0.02	NO		NONE	NONE	0.50	0.55	<	5.00		0.60
2-CHLOROPHENOL 95578 1A		81.00	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
CHRYSENE 218019 18B		0.0028	0.00	undetermined	1.00	0.6	0.9	0.50	0.47	<	1.00		0.60
CYANIDE 57125 14M	0.0100	700	0.01	NO		NONE	NONE	0.50	0.55	<	0.01		0.60
DDT 50293 7P		0.00059	0.00	NO		NONE	NONE	0.50	0.55	<	0.10		0.60
DDT METABOLITE (DDE) 72559 8P		0.00059	0.00	NO		NONE	NONE	0.50	0.55	<	0.10		0.60

OUTFALL 001 ALCOA WENATCHEE, NPDES PERMIT # WA-000068-0 **Parameter**	Ambient Concentration (Geometric Mean) *ug/L*	Water Quality Criteria for Protection of Human Health *ug/L*	Max concentration at edge of chronic mixing zone. *ug/L*	LIMIT REQ'D?	Expected Number of Compliance Samples per Month	AVERAGE MONTHLY EFFLUENT LIMIT *ug/L*	MAXIMUM DAILY EFFLUENT LIMIT *ug/L*	Estimated Percentile at 95% Confidence	*Pn*		Max effluent conc. measured *ug/L*		Coeff Variation *CV*
DDT METABOLITE (DDD) 72548 9P		0.00083	0.00	NO		NONE	NONE	0.50	0.55	<	0.10		0.60
DIBENZO(a,h)ANTHRACENE 53703 19B		0.0028	0.00	undetermined	1.00	0.6	0.9	0.50	0.55	<	1.00		0.60
DIBUTYLPHTHALATE 84742		2700	0.02	NO		NONE	NONE	0.50	0.55	<	5.00		0.60
1,2 DICHLOROBENZENE 95501 20B		2700	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
1,3 DICHLOROBENZENE 541731 21B		400	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
1,4 DICHLOROBENZENE 106467 22B		400	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
3,3 DICHLOROBENZIDINE 91941 23B		0.04	0.04	undetermined	1.00	8.4	12.3	0.50	0.55	<	10.00		0.60
DICHLOROBROMOMETHANE 75274 12V		0.27	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
1,2 DICHLOROETHANE 107062 15V		0.38	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
1,1 DICHLOROETHYLENE 75354 16V		0.057	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
2,4 DICHLOROPHENOL 120832 2A		93.00	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
1,2 DICHLOROPROPANE 78875		0.50	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
1,3 -DICHLOROPROPYLENE 542756 18V		10	0.00	NO		NONE	NONE	0.50	0.47	<	0.50		0.60
DIELDRIN 60571 10P		0.00014	0.00	undetermined	1.00	0.0	0.0	0.50	0.55	<	0.10		0.60
DIETHYLPHTHALATE 84662 24B		23000	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
2,4 DIMETHYLPHENOL 105679		380.00	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
DIMETHYLPHTHALATE 131113 25B		313000	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
DI-n-BUTYL PHTHALATE 84742 26B		2700	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
2,4-DINITROPHENOL 51285 5A		70.0	0.04	NO		NONE	NONE	0.50	0.55	<	10.00		0.60
DINITROTOLUENE 2,4 121142 27B		0.11	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
DIOXIN (2,3,7,8-TCDD) 1746016		0.000000013	0.00	undetermined	1.00	0.0	0.0	0.50	0.55	<	0.00		0.60
1,2 DIPHENYLHYDRAZINE 122667 30B		0.04	0.01	NO		NONE	NONE	0.50	0.05	<	1.00		0.60
ENDOSULFAN SULFATE 1031078 13P		0.93	0.00	NO		NONE	NONE	0.50	0.55	<	0.10		0.60
ENDRIN 72208 14P		0.76	0.00	NO		NONE	NONE	0.50	0.55	<	0.10		0.60
ENDRIN ALDEHYDE 7421934 15P		0.76	0.00	NO		NONE	NONE	0.50	0.55	<	0.10		0.60
ETHYLBENZENE 100414 19V		3100	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
FLUORANTHENE 206440 31B		300	0.00	NO		NONE	NONE	0.50	0.47	<	1.00		0.60
FLUORENE 86737 32B		1300	0.00	NO		NONE	NONE	0.50	0.47	<	1.00		0.60
HEPTACHLOR 76448 16P		0.00021	0.00	undetermined	1.00	0.0	0.1	0.50	0.55	<	0.05		0.60
HEPTACHLOR EPOXIDE 1024573 17P		0.00010	0.00	undetermined	1.00	0.0	0.0	0.50	0.55	<	0.05		0.60
HEXACHLOROBENZENE 118741 33B		0.00075	0.00	undetermined	1.00	0.2	0.2	0.50	0.55	<	1.00		0.60
HEXACHLOROBUTADIENE 87683 34B		0.44	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
HEXACHLOROCYCLOHEXANE-ALPHA 319846 2P		0.0039	0.00	NO		NONE	NONE	0.50	0.55	<	0.05		0.60
HEXACHLOROCYCLOHEXANE-BETA 319857 3P		0.014	0.00	NO		NONE	NONE	0.50	0.55	<	0.05		0.60

OUTFALL 001 ALCOA WENATCHEE, NPDES PERMIT # WA-000068-0 **Parameter**	Ambient Concentration (Geometric Mean) *ug/L*	Water Quality Criteria for Protection of Human Health *ug/L*	Max concentration at edge of chronic mixing zone. *ug/L*	LIMIT REQ'D?	Expected Number of Compliance Samples per Month	AVERAGE MONTHLY EFFLUENT LIMIT *ug/L*	MAXIMUM DAILY EFFLUENT LIMIT *ug/L*	Estimated Percentile at 95% Confidence	*Pn*		Max effluent conc. measured *ug/L*		Coeff Variation *CV*
HEXACHLOROCYCLOHEXANE-GAMMA (lindane) 58899 4P		0.019	0.00	NO		NONE	NONE	0.50	0.55	<	0.05		0.60
HEXACHLOROCYCLOPENTADIENE 77474 35B		240	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
HEXACHLOROETHANE 67721 36B		1.90	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
INDENO(1,2,3-cd)PYRENE 193395 37B		0.0028	0.00	undetermined	1.00	0.6	0.9	0.50	0.47	<	1.00		0.60
IRON 7439896		300.00	0.00	NO		NONE	NONE	0.50	0.05	<	0.02		0.60
ISOPHORONE 78591		8.40	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
MANGANESE 7439965		50.00	0.00	NO		NONE	NONE	0.50	0.05	<	0.01		0.60
METHYL BROMIDE 74839 20V		48	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
METHYLENE CHLORIDE 75092 22V		4.7	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
MERCURY 7439976 8M	0.0012	0.14	0.00	NO		NONE	NONE	0.50	0.72	<	0.01		0.60
NICKEL - 7440020 9M - Dependent on hardness		610	0.00	NO		NONE	NONE	0.50	0.37	<	0.01		0.60
NITROBENZENE 98953 40B		17	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
NITRATE/NITRITE (N)		10000.00	0.00	NO		NONE	NONE	0.50	0.05	<	0.05		0.60
NITROSODIMETHYLAMINE N 62759 41B		0.00069	0.01	undetermined	1.00	0.1	0.2	0.50	0.47	<	2.00		0.60
N- NITROSODI-N-PROPYLAMINE 621647		0.005	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
NITROSODIPHENYLAMINE N 86306 43B		5	0.01	NO		NONE	NONE	0.50	0.37	<	1.00		0.60
PENTACHLOROPHENOL 87865 8A (pH dependent in		0.28	0.00	NO		NONE	NONE	0.50	0.47	<	1.00		0.60
PHENOL 108952 10A		21000	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
Polychlorinated Biphenyls (PCB's) 53469219, 11097691, 1104282, 1114		0.000170	0.00	undetermined	1.00	0.0	0.1	0.50	0.55	<	1.00		0.60
PYRENE 129000 45B		960	0.00	NO		NONE	NONE	0.50	0.47	<	1.00		0.60
SELENIUM 7782492 10M		170.00	0.00	NO		NONE	NONE	0.50	0.22	<	0.01		0.60
TETRACHLOROETHANE 1,1,2,2 79345 23V		0.17	0.00	NO		NONE	NONE	0.50	0.47	<	0.50		0.60
TETRACHLOROETHYLENE 127184 24V		0.80	0.00	NO		NONE	NONE	0.50	0.47	<	0.50		0.60
THALLIUM 7440280 12M		1.70	0.00	NO		NONE	NONE	0.50	0.22	<	0.01		0.60
TOLUENE 108883 25V		6800	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
TOXAPHENE 8001352 25P		0.00073	0.02	undetermined	1.00	0.2	0.2	0.50	0.55	<	5.00		0.60
1,2-TRANS-DICHLOROETHYLENE 156605		700	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
TRICHLOROBENZENE 1,2,4 120821		260	0.00	NO		NONE	NONE	0.50	0.55	<	1.00		0.60
TRICHLOROETHANE 1,1,1 71556 27V		200.00	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
TRICHLOROETHANE 1,1,2 79005 28V		0.60	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
TRICHLOROETHYLENE 79016 29V		2.70	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60
TRICHLOROPHENOL 2,4,6 88062 11A		2.10	0.00	NO		NONE	NONE	0.50	0.47	<	1.00		0.60
VINYL CHLORIDE 75014 31V		2	0.00	NO		NONE	NONE	0.50	0.55	<	0.50		0.60

ALCOA, Wenatchee – Acute WET Test Results as NOEC / LOEC

Link Code	Start Date	Organism	Endpoint	NOEC	LOEC	MSDp
KJOI195	05/13/92	Fathead Minnow	96h Proportion Survived	100	>100	
KJOI196	05/13/92	Daphnia pulex	48h Proportion Survived	<100	100	25.05%
KJOI197	07/23/92	Fathead Minnow	96h Proportion Survived	100	>100	
KJOI198	07/23/92	Daphnia pulex	48h Proportion Survived	100	>100	11.79%
KJOI202	09/30/92	Fathead Minnow	96h Proportion Survived	100	>100	
KJOI203	09/30/92	Daphnia pulex	48h Proportion Survived	<100	100	12.62%
KJOI204	11/10/92	Fathead Minnow	96h Proportion Survived	100	>100	
KJOI205	11/10/92	Daphnia pulex	48h Proportion Survived	100	>100	22.60%
KJOI209	01/20/93	Fathead Minnow	96h Proportion Survived	100	>100	
KJOI210	01/20/93	Daphnia pulex	48h Proportion Survived	100	>100	13.53%
KJOI211	03/09/93	Fathead Minnow	96h Proportion Survived	100	>100	
KJOI212	03/09/93	Daphnia pulex	48h Proportion Survived	100	>100	42.89%
KJOI219	05/11/93	Daphnia pulex	48h Proportion Survived	100	>100	22.95%
KJOI220	08/10/93	Daphnia pulex	48h Proportion Survived	100	>100	
KJOI221	12/01/93	Daphnia pulex	48h Proportion Survived	100	>100	27.92%
KJOI637	02/16/94	Daphnia pulex	48h Proportion Survived	100	>100	
KJOI657	05/11/94	Rainbow Trout	96h Proportion Survived	100	>100	6.17%
KJOI656	05/11/94	Daphnia pulex	48h Proportion Survived	100	>100	
KJOI638	08/17/94	Daphnia pulex	48h Proportion Survived	100	>100	12.18%
KJOI641	12/07/94	Rainbow Trout	96h Proportion Survived	100	>100	6.17%
KJOI639	12/07/94	Daphnia pulex	48h Proportion Survived	<100	100	7.56%
KJOI640	12/21/94	Daphnia pulex	48h Proportion Survived	100	>100	24.43%
KJOI642	03/01/95	Daphnia pulex	48h Proportion Survived	100	>100	11.57%
AQNA0540	05/17/95	Rainbow Trout	96h Proportion Survived	100	>100	16.94%
AQTX0539	05/17/95	Daphnia pulex	48h Proportion Survived	100	>100	17.22%
AQTX0371	08/16/95	Daphnia pulex	48h Proportion Survived	100	>100	
AQTX0549	12/13/95	Daphnia pulex	48h Proportion Survived	100	>100	
AQTX0662	03/13/96	Daphnia pulex	48h Proportion Survived	100	>100	
AQNA0820	06/05/96	Rainbow Trout	96h Proportion Survived	100	>100	4.85%
AQTX0819	06/05/96	Daphnia pulex	48h Proportion Survived	100	>100	11.57%
AQTX0938	08/21/96	Daphnia pulex	48h Proportion Survived	<100	100	10.74%
AQTX1120	12/04/96	Rainbow Trout	96h Proportion Survived	100	>100	
AQTX1119	12/04/96	Daphnia pulex	48h Proportion Survived	100	>100	
AQTX1350	03/19/97	Daphnia pulex	48h Proportion Survived	100	>100	
AQTX1430	06/04/97	Rainbow Trout	96h Proportion Survived	<100	100	6.62%
AQTX1429	06/04/97	Daphnia pulex	48h Proportion Survived	100	>100	
AQTX1432	06/13/97	Rainbow Trout	96h Proportion Survived	100	>100	
AQTX1432UP	06/13/97	Rainbow Trout	96h Proportion Survived	100	>100	

ALCOA, Wenatchee - Acute WET Test Results as NOEC / LOEC

Link Code	Start Date	Organism	Endpoint	NOEC	LOEC	MSDp
AQTX1431	06/13/97	Daphnia pulex	48h Proportion Survived	100	>100	
AQTX1431UP	06/13/97	Daphnia pulex	48h Proportion Survived	100	>100	
AQTX1428	08/27/97	Daphnia pulex	48h Proportion Survived	100	>100	
AQTX1457	11/05/97	Rainbow Trout	96h Proportion Survived	100	>100	
AQTX1772	03/18/98	Fathead Minnow	96h Proportion Survived	100	>100	
AQTX1878	05/28/98	Daphnia magna	48h Proportion Survived	100	>100	
AQTX1958	09/09/98	Rainbow Trout	96h Proportion Survived	100	>100	
AQTX003110	12/09/98	Fathead Minnow	96h Proportion Survived	100	>100	
AQTX2181	02/24/99	Daphnia magna	48h Proportion Survived	100	>100	49.83%
AQTX2170	05/12/99	Rainbow Trout	96h Proportion Survived	100	>100	
AQTX003108	09/22/99	Fathead Minnow	96h Proportion Survived	100	>100	7.44%
AQTX003109	12/08/99	Daphnia magna	48h Proportion Survived	100	>100	
AQTX002692	02/02/00		96h Proportion Survived	100	>100	
AQTX002297	06/21/00	Fathead Minnow	96h Proportion Survived	100	>100	
AQTX00269	09/07/00	Daphnia magna	48h Proportion Survived	100	>100	
AQTX003045	12/19/00	Rainbow Trout	96h Proportion Survived	100	>100	
AQTX003046	03/20/01	Fathead Minnow	96h Proportion Survived	100	>100	
AQTX003047	06/19/01	Daphnia magna	48h Proportion Survived	100	>100	5.59%
AQTX003048	08/30/01	Rainbow Trout	96h Proportion Survived	100	>100	
AQTX003049	11/13/01	Fathead Minnow	96h Proportion Survived	100	>100	5.92%
AQTX003050	03/13/02	Daphnia magna	48h Proportion Survived	100	>100	
aarm0120	05/29/02	Rainbow Trout	96h Proportion Survived	100	>100	
aarm0119	09/25/02	Fathead Minnow	96h Proportion Survived	100	>100	3.38%
aarm0118	12/11/02	Daphnia magna	48h Proportion Survived	100	>100	6.97%
aarm0117	02/26/03	Rainbow Trout	96h Proportion Survived	100	>100	
aarm0180	06/18/03		96h Proportion Survived	100	>100	13.59%
aarm0181	09/24/03	Daphnia magna	48h Proportion Survived	100	>100	17.37%
aarm0182	12/10/03	Rainbow Trout	96h Proportion Survived	100	>100	6.68%
aarm0183	03/24/04		96h Proportion Survived	100	>100	5.26%
ekot0157	06/23/04	Daphnia magna	48h Proportion Survived	100	>100	11.62%
ekot0158	07/29/04	Rainbow Trout	96h Proportion Survived	100	>100	10.82%
ekot0159	12/29/04	Fathead Minnow	96h Proportion Survived	100	>100	5.26%
ekot0160	03/16/05	Daphnia magna	48h Proportion Survived	100	>100	5.00%
nlow0011	05/19/05	Rainbow Trout	96h Proportion Survived	100	>100	2.50%

NOEC	No observed effect concentration
LOEL	Lowest observed effect level
MSDp	% Minimum significant difference

Mixing Zone Analysis (Page 1 of 2)

Dilution Model Input Parameter						
Model Input Parameter	**Units**	**Outfall 001**	**References**			
Number of Ports		10	ENSR's Initial Dilution Study June			
			1992 Document #0225-007-501			
Port Diameter	m	0.2286	Same as above			
Port Spacing	m	5.791	Same as above			
Depth of Diffuser (MLLW)	m	10.97	Same as above			
Port Height	m	175.87	Same as above			
Vertical Angle	Degree	30	Same as above			
Horizontal Angle	Degree	15	Same as above			
Effluent Temperature (August average last 3 yrs)	ºC	21.5	From Discharge Monitoring Reports			
Total Discharge Acute (Highest Daily Max. Values) last 3 yrs (from July - September)	MGD	4.7	From Discharge Monitoring Reports			
Total Discharge Chronic (Highest Monthly Average Values) last 3 yrs (from July - September)	MGD	4.36	From Discharge Monitoring Reports			
Ambient Temperature (Maximum)	ºC	20.6	1998 NPDES Compliance WW			
			Discharge & Receiving W Report			
Ambient Current Velocity	m/s	0.121	ENSR's Initial Dilution Study June			
			1992 Document #0225-007-501			
Model		**UDKW**				
Information from DMR	**Outfall 001**		**Temperature ºF**			
Month/Year	DM	MA	Outfall 001			
July-1996	3.7	3.5	68			
August-1996	3.8	3.6	**71**	71		
Sept-1996	3.8	3.7	69			
July-1997	3.7	3.5	66			
August-1997	3.6	3.5	**70**	70		
Sept-1997	4.1	3.5	69			
July-1998	4.6	4.0	68			
August-1998	4.1	3.9	**71**	71		
Sept-1998	4.7	4.4	71			
			Average	70.7		
Highest Flow at critical condition (MGD)	4.7	4.4				
Temperature at critical condition				21.5°C		

DILUTION FACTOR RESULTS FOR OUTFALL 001				
		Acute	**Chronic**	
	Current (m/s)	Outfall 001	Outfall 001	
At 90th percentile flooded tide	0.34	45		
At 50th percentile flooded tide	0.13		415	
Flow @ critical condition from June to September		**7.0 MGD (Highest Daily Maximum)**	**4.1 MGD (Highest Monthly Average)**	
Effluent Temperature (Ave. of month August)		28.7 ºC	28.7 ºC	
Model		UDKW	UDKW	
Current Permit		28	157	
Decision Factors:				
Use UDKW model for Outfall 001 and UM3 model for Outfall 002 to maintain consistency				
with previous years' modeling				
UDKW was already calibrated along with EFDC model and dye results.				
Use 10th or 90th pecentile flood tide current velocity as the critical condition.				
Goal to minimize dilution factor per WAC 173-201A-400				